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Parents' National Educational Union.

Central Offices : 28, VICTORIA STREET, S.W.

Some Suggestions for :

1. The Study of Astronomy.
2. Children's Natural History
Work :

together with a

List of Books worth reading.

January, 1899.

*Additional copies of this pamphlet may be purchased by Members,
price 2d.*

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PARENTS' NATIONAL EDUCATIONAL UNION.

Natural History Club.

OBJECTS.

1. To promote the systematic study of Natural History.
2. To stimulate and guide amateurs in giving Nature Lessons.

COMMITTEE

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FEE FOR MEMBERSHIP - - - 2/6

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SUGGESTIONS FOR THE STUDY of ASTRONOMY.

Direct observation should form the basis of study. No instruments are needed to see that the heavens as a whole appear to revolve round the earth, to note the relative fixity of the stars, and to trace the paths of sun, moon, and planets in the sky. When these phenomena have been thoroughly realised, it will be time to seek their causes. Some simple home-made apparatus (as indicated below, and in Professor Todd's "New Astronomy") are of great educational value, and drawing from observation, should be encouraged. Elder children may be taught the use of the globes, and with a good opera glass may observe many interesting details of the heavenly bodies. A visit to an observatory will be much better appreciated if they have had some experience in handling small instruments of their own. Geometry and mathematics are valuable but not indispensable adjuncts to the study of elementary astronomy.

Keep books of drawings and observations made.

It is advisable to take in some such paper as "Knowledge," or the "English Mechanic," which contain news of astronomical discoveries, and monthly lists of phenomena to be observed.

SUN.—Note the movements of the sun by the shadow of a tree or post, on a clear level piece of ground, or if this is impossible, a strong board may be laid flat on a wide window-sill looking south, and a long nail driven in vertically. Mark the motion of the shadow through the day, its varying length and direction, and its position when shortest.

Notice the different curves traced by the shadow, and the difference in its length at different seasons. Note the points of sunrise and sunset on the horizon through the year. Note the stars seen in the west just after sunset each month. Look for the zodiacal light after sunset in spring (if the atmosphere is clear). Note the prismatic colours of sunlight in glass jets, and the rainbow. A good prism intercepting a ray of sunlight which is allowed to pass through a slit in a piece of cardboard set in a darkened window, will show the principal Fraunhofer lines.

MOON.—Note her movements on consecutive nights (1) with reference to the sun in connection with the phase, (2) with reference to her position among the stars. Note the difference in height above the horizon at different seasons, and the points of rising and setting. Make drawings of the markings as seen with the naked eye, and note that their position with regard to the limb does not appreciably change, showing that we are always looking at the same face. In lunar eclipses, note the colour of the immersed portion, time of duration, and the quantity if partial. Note the shape of shadow's outline.

SENIORS (Children above 12). With opera-glass identify and draw seas, mountain-ranges, and conspicuous craters, etc. In eclipses, watch the progress of umbra over the maria.

STARS.—Learn the principal constellations, so as to recognize them easily in every position, and to draw them. Note the daily, and also the yearly motion of the Great Bear and other circumpolar groups, then of more southerly constellations. A cardboard frame, divided into small numbered squares by crossed threads and fixed in a corner of a window, will make apparent to an observer looking through it the rapid motion of a bright star such as Sirius or Altair. Observe the different star colours, and estimate their magnitudes, by comparison with standard stars. Observe the naked eye doubles and variables, nebulae and clusters. On very clear nights make rough drawings of the Milky Way on prepared star-charts, using bright stars as guides.

SENIORS. Find the celestial equator, the colures, ecliptic and equinoxes among the stars, and learn approximately the

right ascension and declination of some bright stars. Estimate the angular distances of stars. Observe the double stars, variables, clusters and nebulae visible in opera-glasses. (see Gore's "Scenery of the Heavens.")

PLANETS.—**VENUS AND MERCURY.** Note their movements with regard to the sun, and the horizon, and their variation in brightness. **MARS, JUPITER, SATURN.** Note and trace on star-charts their movement among the stars.

SENIORS. Look at Jupiter's moons with opera-glass.

METEORS.—Watch for special showers. Note brightness, direction, and length of path among the stars, time and duration of visibility. Draw their paths on star-charts.

SUGGESTIONS FOR CHILDREN'S WORK

SPRING, 1899.

MEMBERS OVER 10 YEARS.

1. Make a list of the flowers in your garden, and another of the flowers you see in the hedges.

2. Watch the leaf buds as they open from day to day and make notes of anything that strikes you in their various methods of opening. Make a list of the dates when the fruit trees blossom.

3. Make a sketch map of a field, of your garden, or of a small area of ground (say about five acres) giving its position with respect to the points of the compass. State whether it stands at a high or low level above the sea; what is its geological structure, and send in a few good specimens to illustrate this.

Make a collection of the fauna and flora of your chosen area. Make a full list of all the plants and animals you discover, giving a brief description with sketches, of any you cannot name or preserve.

Note the position of your principal finds on the map.

In describing your specimens give the locality, date and position (in water, marshy, or dry ground.)

4. Chrysalises collected in the autumn should be placed in dry moss in suitable breeding cages. Drawings should be made of them, and notes taken of their color, structure, &c. Draw and describe the butterflies and moths that emerge.

Make a collection of the common insects of the house and garden. Those that cannot be preserved can be drawn and described.

Study the ways in which the leaves on the lower branches of trees are arranged, so as to expose the greatest amount of their surfaces to the light. Leaf Mosaic—see "Kerner and Oliver's Plant Physiology."

Press good examples of these arrangements or make drawings.

TO THOSE BY THE SEASIDE.

5. Make a sketch map showing the direction of the shore line and the position of the town, with their relation to the points of the compass. Make a collection of shells and sea-weeds and note how far below high water mark, you find the different specimens.

FOR THOSE UNDER 10.

6. Make sketches of six different kinds of Spring Flowers, and tell where you found the flower and when. Don't forget the leaves.

A LIST OF USEFUL BOOKS.

The following list of books is not put forward as anything like a complete one, but contains the names of those books which have been found most useful by the members of the Natural History Club Committee. Suggestions for additions to this list are invited.

NATURAL HISTORY.

Elementary.

Fairy Land of Science	...	...	Buckley	6/-
Winners in Life's Race	...	...	"	6/6
Life and her Children	...	...	"	6/-
My Backyard Zoo	...	...	J. G. Wood	
Wild Nature won by Kindness	...	...	Mrs. Brightwen	5/-
Inmates of my house and garden	...	...	"	"

Advanced.

Outdoor World	...	...	Furieux	7/6
Round the Year	...	...	Miall	6/-
Curiosities of Natural History	...	...	Buckland	
Natural History of Selborne...	...	...	Gilbert White	
Natural History Essays	...	...	Waterton	
Malay Archipelago	...	...	Wallace	
Homes without hands	...	...	J. G. Wood	
Royal Natural History	...	...	Lydekker	9/- per vol.
Life at the Zoo	...	...	Cornish	
Winter Sunshine	...	...	Borroughs	1/-
Vertebrates	} International Sc. Series	...	Macalister,	1/ each
Invertebrates		...		

BIRDS.

A Year with the Birds	...	...	Warde Fowler	3/6
British Birds	...	...	W. H. Hudson	
Our Country's Birds and how to know them	...	...	Gordon	6/-

INSECTS, &C.

Elementary.

Our Butterflies and how to know them	...	...	W. J. Gordon	
Silkworms	...	...	E. A. Butler	1/-
Our Country's Butterflies and Moths	...	...	W. J. Gordon	6/-
Text book of Entomology	...	...	Kirby	

Advanced.

Common British Insects	...	...	J. G. Wood	
Insects at home	...	...	"	"
Insects abroad	...	...	"	"
Our household Insects	...	...	E. A. Butler	6/-
Ant, Bees and Wasps...	...	...	Lubbock	6/-
British Beetles	...	...	Rye and Fowler	
British Butterflies and Moths	...	...	Furieux	7/6

AQUARIA.

Freshwater Aquaria	...	...	Bateman	
Ponds and Rock Pools	...	...	Scherren	
Manual of Marine Zoology	...	...	Gosse	7/6
The Aquarium or wonders of the Deep Sea	...	...	Gosse	7/6
Aquarium Book, Freshwater and Marine, illustrated	...	...	pub. Upcott Gill	2/6 each
Handbook of the Marine Aquarium	...	...	Gosse	2/6

BOTANY.

Elementary.

Botany for Beginners	...	...	G. Henslow	
Text Book of Botany	...	...	Hooker	1/-
Botany for Beginners	...	...	Masters	
Botany for Children	...	...	Henslow	2/6
Flowers of the Field...	...	...	Johns	5/-
Elementary Botany	...	...	Percy Groom	

Advanced.

Natural History of Plants	...	...	Kerner and Oliver	
Structural Botany —	...	...	Dr. Scott	
Flowering Plants	...	...		3/6
Flowerless "	...	...		3/6
The Oak	...	...	Prof. M. Ward	3/6
The Vegetable Kingdom	...	...	Oliver	16/-
British Wild Flowers in relation to Insects	...	...	Lubbock	
British and Foreign Ferns	...	...	Smith, J.	
Handbook of Mosses...	...	...	Dixon & Jameson	18/-
Mushrooms and Toadstools...	...	...	Worthington Smith	1/-
A Plain and Easy Account of British Fungi	...	...	Cooke	6/-

Floras.

Babington	...	...		10/6
Bentham and Hooker, illustrated	...	...	2 vols.	10/6 each
Hooker's Student's Flora	...	...		10/6

GEOLOGY.

Elementary.

Town Geology	Kingsley	
The World's Foundations	Giberne, A.	5/-
Madam How and Lady Why	Kingsley	3/6
Our Common British Fossils and where to find them	Taylor	5/-

Advanced.

Primer of Geology	Geikie	1/-
Chapters from the Physical History of the Earth	Nicol	
The Story of a Boulder	Geikie	
Open Air Studies in Geology	G. J. Cole	10/-
Story of our Planet	Bonney	
Elementary Geology, Ed. 97	Lyell	
Coal and what we get from it	Meldola	
Students Handbook of Physical Geology	Jukes Brown	6/-
—————Historical Geology	" "	6/-
—————Prehistoric Geology	" "	6/-
The Study of Rocks	" "	4/6

ASTRONOMY.

Advanced.

Necessary.	{ The New Astronomy... ..	D. P. Todd	7/6
	or Lessons in Astronomy	Young	6/-
Recommended.	{ Observational Astronomy	Mee	2/6
	Concise Knowledge Astronomy	Clerke, Fowler, Gore	5/-
	Scenery of the Heavens	J. E. Gore	5/- nett
	Other Worlds than Ours	Proctor	3/6
	The Expanse of Heaven	"	5/-
	Myths and Marvels of Astronomy	"	6/-
	Total Eclipses of the Sun	M. L. Todd	
	The Herschels & Modern Astronomy	Clerke	3/6
	Astronomy for Every Day Readers	Hopkins	1/6
	Great Astronomers	Ball	7/6
	Atlas, Proctor's		7/-
	Handy Map of the Moon—Mellor— or Beer and Madler's map reduced		2/6

Elementary.

Necessary.	{ Half-Hours with the Stars	Proctor	5/-
	or, Easy Guide to the Constellations,	Gall	1/-
	The Planet Earth	Gregory 2/, Macmillan	
	The Story of the Stars	Chambers 1/, Newnes	
Recommended.	{ Stories from Starland.. ..	Mary Proctor	3/-
	Sun Moon and Stars	Agnes Giberne	5/-
	Radiant Suns	"	5/-
	Starland	R. S. Ball	5/-
	Flowers of the Sky	Proctor	4/6
	Star Atlas, The People's Atlas	Gall	1/-
	Revolving Planisphere (showing what stars are visible in Latitude 50° N for every hour of the year)	Phillips	2/ nett
	Phillip's Orrery (showing when and where Planets are visible)		4/6

For use with a small telescope.

Popular Telescopic Astronomy	Fowler	2/-
Hours with a Three-inch Telescope, (out of print)	Noble	
Observer's Atlas of the Heavens	Peck	21/ nett



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